

XLIX.—*On the Significance of the Proliferated Epithelium in the Fœtal Mammalian Jaw.* By R. BROOM, M.B., B.Sc.

IF a transverse section be made through the anterior part of the lower jaw of a seven-month human fœtus, it will be noticed that from the outer alveolar margin and about half of the adjacent tooth-space arises a well-developed and projecting gum, which is covered, especially on the inner side, by a layer of epithelium many times thicker than that covering the adjoining mucous membrane. On the inner side of this epithelial covered ridge is the neck of the dental germ.

On serial section it will be found that, though this ridge of gum extends all round the alveolar margin, the thick coating of epithelium is only met with in the region of the incisors and canines, and that on reaching the first milk-molar the epithelial armature of the gum differs little from that of the general mucous membrane of the mouth.

That this epithelial protection is directly connected with the requirements of the young mammal in grasping and retaining the nipple will readily suggest itself; but when one finds that, within certain limits, the younger the fœtus examined the more is the epithelial ridge developed proportionally, one is led to think that the proliferated epithelium has a deeper significance than merely the strengthening of the gum during the short period of sucking.

Even in the human fœtus of ten weeks there is a ridge of thick epithelium covering the incisor part of the jaws, but, as in older specimens, entirely confined to that part. A similar condition seems to exist in all the higher mammals, though in some the proliferated area extends to the premolar region. In Marsupials the thick layer of epithelium, besides covering the incisor part of the jaws, passes back to the molar region, and differs from the typical mammalian condition in extending to and covering the inner part of the lips.

That the thickened epithelium on the sides of the mouth in the marsupial is not specially developed to protect the jaws while grasping the nipple may be inferred from the fact that the tongue and the palate, which have almost the entire share in holding the nipple, are coated with a uniform comparatively thin layer of squamous epithelium. Even in placental mammals the epithelial armature of the jaw is developed at such an early date as to suggest its being the remains of an ancestral horny beak.

Geological strata have not yet yielded any evidence of the

immediate ancestors of the mammals; but there is reason to believe that anomodonts and mammals are diverging branches from a common origin, and which primitive group was derived from the higher amphibians. The larva of the frog and of most other amphibians is provided, as is well known, with a horny beak on the front of each jaw, which fulfils all the requirements of teeth. In the siren the horny sheath is retained throughout life. It is impossible to say with what armature the jaws of the young anomodonts were provided; but it is highly probable that they possessed beaks, as in most of the groups of the order we find teeth playing a secondary part. In *Oudenodon* teeth were entirely absent, and the jaws have evidently been provided with a strong horny casing. A similar condition existed in *Dicynodon*, with the addition of a pair of large maxillary teeth. In *Endothiodon* we find the unique arrangement of a horny beak on the premaxilla and maxilla, with a row of small teeth in addition on the maxilla internal to the horny edge. The theriodonts had a row of teeth along the alveolar margin of the premaxilla and maxilla, though it is probable that, as Owen believed (Todd's *Cyclop. Anat. and Phys.*, art. Teeth), these animals were monophyodont, and in this differed entirely from the ordinary reptilian type. In the remaining group of anomodonts, of which *Pariasaurus* is the type, we find a single feebly developed set of teeth.

As we find evidences of a horny beak in many of the anomodonts, or a feeble development of teeth, rendering probable the existence of a horny armature in the young of this group, which is most nearly allied to the mammals of which we have remains, there is every reason to suppose that the proliferated epithelium which arms the front of the fœtal mammalian jaw is the exact homologue of the horny beak of the anomodont and the remains of a functional beak possessed by the young of the mammalian ancestor. These young were probably furnished with a well-developed horny beak on escaping from the egg, and, being probably aquatic in habit, derived nourishment from sucking plants and decomposing animal matter.

The marsupials are probably derived from a subdivision of this premammalian group, in which the horny beak of the young was developed to a greater extent and retained to a later period in life, aborting the secondary tooth-germs, and resulting in the descendants being practically monophyodont.

Taralga, New South Wales,
Jan. 20, 1895.